

CLAIMS:

- 1 1. A method of forming a stacked semiconductor device, comprising:
2 forming one or more layers of compliant material on at least a portion of the top
3 surface of a substrate, said substrate having one or more interconnect structures formed
4 thereon, said interconnect structures each having a top surface;
5 curing at least a portion of the semiconductor device; and
6 selectively removing a portion of the one or more layers of compliant material;
7 assembling the substrate into a stacked semiconductor device.
- 1 2. The method of claim 1, wherein at least one of the one or more layers of material
2 comprise non-conductive compliant materials.
- 1 3. The method of claim 2, wherein one or more layers comprise polymer based
2 layers.
- 1 4. The method of claim 3, wherein one or more layers comprise a photodefinable
2 polymer layer.
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- 4 5. The method of claim 1, wherein at least one of the one or more layers are formed
5 by use of a deposition process.
- 1 6. The method of claim 1, wherein at least one of the one or more layers are formed
2 by use of one or more of: spin coating, dip coating and spraying.

1 7. The method of claim 1, wherein said compliant material layer is formed to a
2 thickness greater than the top surface of the one or more interconnect structures.

1 8. The method of claim 1, wherein said curing process comprises an oven curing
2 process.

1 9. The method of claim 1, wherein the selective removing comprises one or more
2 of: chemical mechanical polishing (CMP), reactive ion etching (REI), and grinding.

1 10. The method of claim 1, wherein the selective removing comprises one or more
2 chemical etching processes.

1 11. The method of claim 1, wherein said compliant material layer is selectively
2 removed such that the material is removed from the top surface of one or more
3 interconnect structures.

i 12. A method of forming a stacked semiconductor device, comprising:
2 forming one or more layers of photodefinable material on at least a portion of the
3 top surface of a substrate, said substrate having one or more interconnect structures
4 formed thereon, said interconnect structures each having a top surface;
5 exposing at least a portion of the one or more layers to radiation; and
6 curing at least a portion of the one or more layers; and
7 selectively etching a portion of the one or more layers of compliant material.

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8 assembling the substrate into a stacked semiconductor device.

1 13. The method of claim 12, wherein said forming comprises one or more deposition
2 processes.

1 14. The method of claim 12, wherein said photodefinable material layer is formed to a
2 thickness greater than the top surface of the one or more interconnect structures.

1 15. The method of claim 12, wherein said curing process comprises an oven curing
2 process.

1 16. The method of claim 12, wherein the selective removing comprises one or more
2 of: chemical etch, dry etch, and mechanical etch.

1 17. The method of claim 12, wherein said compliant material layer is selectively
2 removed such that the material is removed from the top surface of one or more
3 interconnect structures.

1 18. A stacked microelectronic device, comprising:
2 a first substrate of silicon, said substrate having a top surface;
3 a plurality of interconnect structures formed on at least a portion of the substrate;
4 a layer of compliant material formed on at least a portion of the top surface of the
5 substrate of silicon;

6 a second substrate of silicon with a plurality of interconnect structures formed
7 thereon, said first and second substrate interconnect structures configured such that at
8 least a portion of the interconnect structures of said first and second substrate respectively
9 are in physical contact.

1 19. The apparatus of claim 18, wherein the apparatus comprises a stacked chipset.

1 20. The apparatus of claim 18, wherein the first and second substrates comprise
2 integrated circuits.

1 21. The apparatus of claim 18, wherein at least a portion of the interconnect structures
2 comprise copper vias.

1 22. The apparatus of claim 18, wherein the complaint material substantially
2 comprises a soft polymer.

1 23. The apparatus of claim 18, wherein the complaint material substantially
2 comprises one of: polyimide, polybenzoxazole, photodefinable siloxane, novolak, or a
3 polynorborene buffer.

1 24. The apparatus of claim 18, wherein the compliant material comprises
2 photodefinable and non-photodefinable materials.